# Preface

This report contains the 1991 annual progress reports of the Research Fellows and students of the Center for Turbulence Research. It is intended primarily as a contractor report to the National Aeronautics and Space Administration, Ames Research Center. In addition to this report, each year several CTR manuscript reports are published to expedite the dissemination of research findings by the CTR Fellows.

The Fellows of the Center for Turbulence Research are engaged in fundamental studies of turbulent flows with the objective of advancing the physical understanding of turbulence which in turn could lead to improved turbulence models for engineering analysis and methodology for turbulence control. The CTR Fellows have a broad range of interests and expertise; together with the NASA-Ames scientific staff and Stanford faculty members, they have formed a stimulating environment devoted to the study of turbulence.

In its fifth year of operation, it appears that CTR has reached its equilibrium in size, comprising nineteen resident Postdoctoral Fellows, two Research Associates, three Senior Research Fellows, and supporting eight doctoral students and ten short term visitors. The major portion of Stanford's doctoral program in turbulence is supported by the United States Air Force Office of Scientific Research and the Office of Naval Research. Many students supported by these programs also conduct their research at the CTR.

Questions on the nature of the small-scale turbulence fluctuations and interscale energy transfer received considerable attention at the Center last year. This increased activity was in part due to the rejuvenation of large eddy simulation and the development of new ideas for subgrid scale modeling. This effort included a novel experimental investigation of the concept of local isotropy at high Reynolds numbers in the world's largest wind tunnel at Ames. The first group of papers in this report contain the findings of these studies. They are followed by reports grouped in the general areas of modeling, combustion, and transition and turbulence physics. The CTR roster for 1991 is provided in the Appendix. Also listed are the members of the Advisory Committee which meets annually to review the Center's program and the Steering Committee which acts on Fellowship applications.

An important item not included in this report is that last year we began serious planning of a postprocessing facility for the CTR. The objective of this facility is to develop advanced software for access and processing of the direct numerical simulation databases. We hope to be able to provide data to the research community outside the boundaries of the CTR as well as to largely circumvent the tedious aspects of data management and computer programming for our visitors, including

the participants at the bi-annual Summer Programs.

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